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Milk-Distribution Costs in West Virginia

I. A Study of the Costs Incurred by 22 Plants During 1933

by R. O. STELZER and L. M. THURSTON

AGRICULTURAL EXPERIMENT STATION
COLLEGE OF AGRICULTURE, WEST VIRGINIA UNIVERSITY
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MORGANTOWN

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Mycologist

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Associate Plant Pathologist

F. J. Schneiderhan, Ph. D.††
Associate Plant Pathologist

Hazel C. Cameron, M. A.
Research Specialist in Nutrition

*In cooperation with the U. S. Department of Agriculture, Washington, D. C.
†In charge of the Lakin Experiment Farm, Lakin, W. Va.
‡In charge of the Reymann Memorial Farms, Wardensville, W. Va.
††In charge of the University Experiment Farm, Kearneysville, W. Va.

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I. A Study of the Costs Incurred by 22 Plants During 1933

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DURING THE PAST few years several attempts have been made to fix the milk-distributing spread in the various markets of the state without adequate data. The Agricultural Adjustment Administration, cooperative associations, and the State Department of Agriculture have been attempting to regulate the distribution of milk by various price-fixing measures and other regulations. Since the spread is the part of the consumer's dollar retained by the milk-distributing plants for the various services they render, it is important that such price-fixing regulations be based upon accurate data.

The spread must be large enough to allow the plants to pay for the service rendered by them and also give them a reasonable return on their investment. A large spread occasioned when plants do not pay the producer a fair price, or charge the consumer too high a price, will result in excessive profits which in turn may result in the expansion of the present plant or in the building of new plants. Such expansions or increased competition may lead to inefficient distribution. A spread too small to pay the cost of distributing milk will eventually result in failure of the plants to pay their bills, including the producer for his milk, the sale of a lower quality product, and a curtailment of the services they render to producer as well as consumer.

Milk distributors have been accused of making excessive profits, and most of the attempts to fix the spread in prices have been based on the assumption that their profits have been excessive.

PURPOSE OF THE STUDY

In order to determine the cost of distributing milk in West Virginia, cost records were obtained from 22 plants for the calendar year 1933. The data in this study show the various costs incurred by the 22 plants and the spread received by them for the various services performed.

ACKNOWLEDGMENT

Credit is here given to the plant owners, managers, and other employees for the opening of their books and allowing the representative of the department of farm economics to examine their books and collect the data. The owners and managers of the various plants gave considerable of their time, supplied office space, and assisted the field workers in obtaining the data. Without this assistance this study would have been impossible. The names of the owners and managers cannot be given because of the confidential nature of the data.

METHOD OF COLLECTING DATA

The data necessary to determine the cost of distributing milk were taken from the accounts and records kept by the 22 co-operating plants. Special forms were prepared by the departments of farm economics and dairy husbandry of the West Virginia Agricultural Experiment Station to be used in recording this information. Members of the staff of the former department spent as much time as necessary in each plant to obtain all the data. The owners as well as the managers and other employees of the plants cooperated fully in making their books and records available.

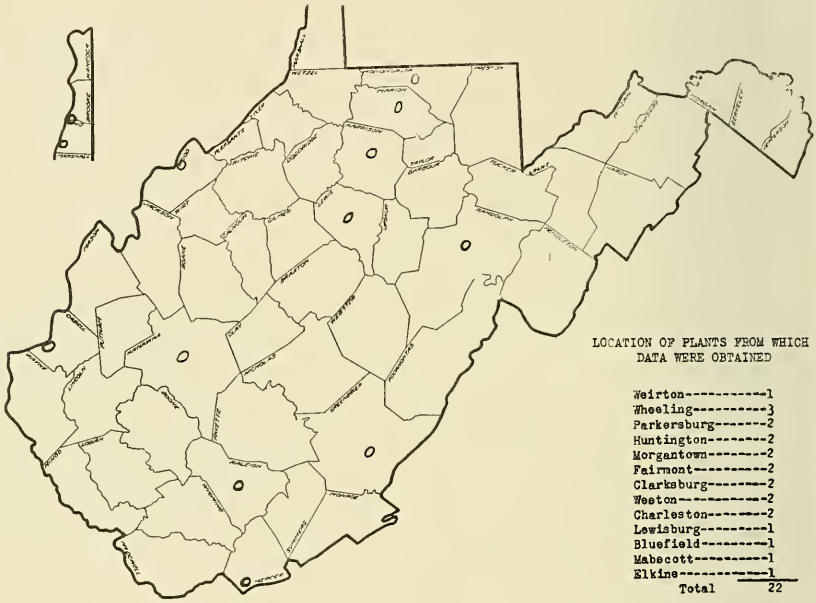

FIG. 1—Location of the 22 cooperating plants in West Virginia from which cost data were obtained in 1933

LOCATION OF PLANTS

Since it was impossible to obtain the records of all milk-distributing plants in the state, an attempt was made to select representative plants in all sections and to use the records only of those plants willing to co-operate in making this study possible.

The 22 cooperating plants are located in the following cities: Wheeling, Weirton, Parkersburg, Huntington, Morgantown, Fairmont, Clarksburg, Weston, Charleston, Lewisburg, Bluefield, Mabscott, and Elkins. Figure 1 shows the location of the distributing plants. They represent a fair cross-section of the state except the Eastern Panhandle and include approximately one-half of the distributing plants. The

averaged-sized plant from which records were obtained was slightly larger than the average plant in the state and, therefore, the total amount of milk handled by the 22 plants was approximately two-thirds of all the fluid milk sold through milk-distributing plants. The plants included in this study represented some of the largest as well as some of the smallest in the state. Estimates have been made which indicate that approximately one-half of the fluid milk sold in the state is sold by plants and the remainder by producer-distributors.* If this estimate is correct, the plants included in this study handled approximately one-third of all the fluid milk and cream sold in West Virginia.

DEFINITION OF TERMS

Certain terms and words are used in this report that have not been standardized or may not be in common use. For the purpose of indicating clearly the meaning of these words, the following definitions are given:

1. *Milk-distributing plant:* A plant that purchases milk and cream for resale to consumers in the form of fluid sales. Each such plant performs a number of services, some of the important ones being: assembling of milk, standardizing, pasteurizing, cooling, bottling, and delivering.

2. *Fluid sales* are the sales of the milk and cream purchased by the milk-distributing plants in the following forms:

   (a) Fluid milk.
   (b) Cream — coffee and whipping, or sometimes designated as single and double cream.
   (c) Other products which include buttermilk, skim milk, chocolate milk, cottage cheese, and surplus milk in the form of cream.

3. *Unit of fluid sales:* All the fluid sales are sold in containers of various sizes ranging from 5-gallon cans to one-half pint bottles. Each sized container is considered as one unit. That is, each 5-gallon can, quart, pint, or one-half pint container is a unit. Cottage cheese is usually sold in 8 to 16-ounce packages. Each of these packages also is considered as a unit.

4. *Wholesale fluid sales* constitute fluid sales to retailers such as stores and restaurants and to consumers of large quantities at wholesale prices.

5. *Retail fluid sales* are fluid sales to consumers at retail prices.

6. *Cost of milk or cost of product* is the cost of the milk and cream purchased by the plants, delivered at the plant, and used for fluid sales.

*Some of the markets in which a survey was made for the years 1929 and 1930 by Ira Could, Jr., and published in the mimeographed circular "The Dairy Situation in Northern West Virginia", showed that the plants handled the following percentage of the total milk produced: Morgantown, 1930, 66%; Fairmont, 1929 and 1930, 30-40%; Parkersburg, 1929, 56%, 1930, 61%; Clarksburg, 1929, 60%, 1930, 45%; Moundsville, 1929, 31%; and Wheeling, 1929, 80%, 1930, 82%. In other markets such as Huntington and Charleston, where no accurate data are available, estimates show that the plants handle approximately 40-50% of the fluid milk sold.

7. *Cost of distribution* is the cost of distributing the wholesale and retail fluid sales and represents all the costs incurred by the plants from the time the milk is received at the plant until it is delivered to and paid for by the purchaser. For the purpose of analysis the costs of distribution have been divided into four groups as follows:

(a) Plant costs represent the cost of receiving, storing, cooling, standardizing, pasteurizing, and other costs incurred in the plant.

(b) Delivery and sales costs include all the costs incurred by the plant in delivering the milk from the plant to the purchaser, including the cost of the containers and advertising.

(c) Administrative costs consist mainly of overhead costs such as management, record keeping, fees, dues, taxes, bad accounts, and interest on borrowed capital.

(d) Interest on the net investment or interest not paid. This item is included as a cost of distributing in determining the total cost of distributing milk, but is eliminated when profits are considered.

8. *Size of plant* refers to the total quantity of milk purchased by a distributing-plant during the year. A plant buying 2,000,000 pounds of milk is considered to be larger in size than one buying 1,500,000 pounds of milk.

9. *Gross sales value* is the total value of the product sold by the plants at the prices charged the purchasers. It does not represent the total gross amount received by plants. Total gross amount received is the total gross sales value less uncollected accounts.

10. *Spread* is the difference between the total gross sales value of milk and the cost of the product. That is, it is the amount of money which plants receive to pay for the cost of distributing milk, plus profits.

11. *Milk-equivalent sold* is the total fluid sales of all the products sold converted to pounds of milk-equivalent at the average test of the fluid milk sold. For example: 100 quarts of 20% cream would equal approximately 1,068 pounds of milk equivalent sold (fluid milk sold containing 4% butterfat).

12. *Loss of butterfat* is the difference between the total pounds of butterfat purchased and the total pounds of butterfat sold, stated as a percentage of total pounds of butterfat purchased.

13. *Profit or loss* is the total gross sales value less the total of all costs except interest not paid.

14. *Returns on investment* refer to the percent profit on the investment: i. e., it represents profit divided by the investment, times 100. Example:

Gross sales value		$162,236.88
Total all costs	$168,423.89	
Less interest not paid	6,447.51	$161,976.38
Profit		$ 260.50
Investment		$150,988.27
Returns on investment		0.17%

15. *Investment* is the total average value of all land, buildings, equipment, accounts receivable, notes receivable, supplies, and cash used during the year (average of beginning and closing inventory values).

16. *Trips per bottle* refers to the total number of units sold (in bottles) divided by the total number of bottles lost during the year.

17. *Employee* is any person, including owners and managers, working during the year in the plant.

18. *Consumer's dollar* is the average price paid for milk by the consumers and is equal to the gross sales value.

COST DATA ON FLUID SALES ONLY

Because this study was concerned only with the cost of distributing milk, cost data were obtained only on that portion of the milk purchased for fluid sales including milk, cream, buttermilk, cottage cheese, skimmilk, and chocolate milk. A number of plants also made and sold such other dairy products as butter and ice cream. From plants of this type the costs incurred in making ice cream and butter were eliminated and were not considered in this study.

The cost records and data of the fluid-sales division were used from those plants having separate accounting systems for fluid sales and manufactured products, no attempt being made to change the division of the joint costs. The records and data concerning the cost of the manufactured products were not taken in these plants. In the few distributing plants handling both types of products and not keeping separate records, the costs were separated, with the aid of the managers, between the fluid sales and manufactured products, in the following manner: All the cost data were first obtained and listed on the prepared forms. Then from these data items that were clearly manufacturing costs were eliminated. Costs incurred in the fluid sales were retained, and the remaining costs were charged to fluid sales on the basis of the total milk purchased and used for fluid sales. For example: one plant used 95% of all the milk purchased for fluid sales and the remaining 5% for the manufacturing of butter. After obtaining a record of all costs, those costs incurred in the manufacturing of butter were eliminated, the costs incurred entirely in the fluid sales were retained, and 95% of the remaining costs were charged to the fluid sales and used in the summarization of these data.

The cost data on fluid sales are not separated in the various forms of (a) milk; (b) cream; and (c) other products. A separation of the cost data into fluid milk, fluid cream, and other products would involve considerable detail and estimation without adding to the value of this

study. The cost of selling cream and other fluid products is as much a part of the cost of distributing milk as is the cost of selling fluid milk. This study, therefore, is based on the assumption that the milk-distributing plant is the unit, rather than considering each separate item of fluid sales as a unit.

The total gross sales value of all fluid sales was used to calculate the average receipts per 100 pounds of milk purchased. No attempt was made to classify the gross sales into the various items such as milk, cream, buttermilk, etc., nor into retail and wholesale sales. All of the plants operate so that each type of fluid sale is a part of their plant sales and, therefore, the gross sales value or the average receipts per hundred pounds of milk purchased is a much better figure to use in determing spread than one that uses only the retail or wholesale price of fluid milk.

The average retail price of milk may be 10 cents per quart, but no plant expects to sell all of its product at this price. Some of the sales are at wholesale prices, others in gallon lots as cream or other products which usually bring considerably less than 10 cents per quart of milk equivalent. A figure that bases the spread enjoyed by plants on the retail price per quart is, therefore, erroneous. The average price paid for all milk and the average price received for all fluid sales was the base used in this study to show costs, receipts, and spread.

ANALYSIS OF COSTS

Several cost items are included on which opinions vary as to how they should be evaluated. Such items as depreciation, interest, bad debts, and plant loss of milk are notable examples. No standardized or recognized special rules have been developed for the computation of these costs. Arbitrary adjustments were not made in any costs except for loss of butterfat. The plants showing a butterfat disposal of less than 96% of the butterfat purchased were allowed a loss of only 4% of the cost of milk as an operating cost. This was included as a plant loss. In the other plants when the loss was 4% or less the actual loss was charged. The process of handling milk in the plant and of delivering it to the consumer results in some unavoidable loss and in the present report this loss is charged as a cost to the operation of the business, because all data unless otherwise stated are based on the quantity of milk purchased.

Some of the plants included in this study appear to have a very high loss of butterfat. If this entire amount were charged as a cost of operation the costs would be increased materially. Various studies made by fluid-milk and accounting companies, notably the International Milk Dealers' Association, indicate that this loss should not exceed 4% of the butterfat or milk purchased. Because of the fact that disposal figures may be inaccurate and to prevent excessive costs for those plants showing high losses, this arbitrary adjustment was made.

The cost data as analyzed are based upon the pounds of milk purchased rather than pounds of milk-equivalent sold because of the high loss of butterfat in some plants due, no doubt, in part to incomplete or

inadequate disposal data (see also the discussion under "Cost of Milk"). All the plants had very complete records on the number of pounds of milk and cream purchased and for this reason practically all calculations concerning costs, gross sales value, spread, and all other data are based on the milk purchased. Some data such as percentage of wholesale-milk equivalent sold per unit, etc., are based on the pounds of milk-equivalent sold.

Depreciation was included as a cost at the rates set up by the various plants but in no case exceeded the rate set up by the federal government in computing federal income taxes. Interest was included as a cost and charged at the rate of 6% on the present net investment after all debts were deducted on which interest was paid. Interest actually paid was listed as an item of cost under administrative expenses.

Bad debts as set up by the various plants in their accounting system were included as a cost. Past experience of the plants together with the managers' estimates of the collectability made it possible to arrive at a fair evaluation of this item.

Practically all other items were cash expenditures incurred during the year and no changes were made in these items except to allow for changes in inventory. Items of cost incurred during the year but not paid were charged as a cost. No changes were made in the salaries paid the owners or managers.

DATA SHOWN BY PLANTS

Because of the wide variation in the size of business of the 22 plants the summary data are shown for individual plants as well as for the average of all plants. Average figures may fail to represent the true situation. Individual plant's figures make it possible to compare one plant with another for the various items shown without revealing the identity of the plants that cooperated. Because of the confidential nature of the individual plant figures the data do not show the difference in cost between the various cities. Any attempt to show the costs for cities would tend to violate this confidence. The cost data, however, indicate a wider difference between the costs of individual plants in the same city than between those plants located in different cities.

COST OF MILK AND SIZE OF PLANTS

Table 1 shows the total amount of milk purchased by each plant, the average test of this milk, the cost of the milk to the plant, the pounds of milk-equivalent sold as fluid sales, and the percent loss of butterfat.

It will be noted that there is a wide variation in the volume of milk handled by each plant. The average price paid per 100 pounds of milk purchased is for the average test of milk purchased as indicated in Table 1. This factor should be considered in comparing the cost of milk for individual plants. A plant buying high-test milk may not be paying more per pound for butterfat than a plant buying a low-test

milk. For example, plant No. 21 shows an average cost of $1.742 per 100 pounds of milk testing 4.4%, while for plant No. 17 the average cost of milk is $1.650 for milk testing 3.80%. For plant No. 21 the cost per pound of butterfat is 39.6 cents and for No. 17 the cost is 43.4 cents. A number of the plants apparently sell more milk than they purchase as a result of standardization. For example, plant No. 1 sells fluid milk testing 4.2%. The average test of the milk purchased by this plant is 4.35%. This variation in test with the small loss of butterfat enables fluid sales of milk-equivalent sold by plant No. 1 to be greater than the total pounds of milk purchased.

The cost of milk shown in this table is the cost of the milk delivered at the plant and as such does not represent the net price received by producers. Such a price would be the average price paid per 100 pounds (Table 1) less the cost of hauling and other costs incurred in marketing milk.

TABLE 1—*The quantity, test, and cost of milk purchased, the quantity and test of the milk-equivalent sold, and the percentage loss of butterfat by plants—1933*

Plant No.	Milk purchased		Total cost of milk	Average cost per hundred	Milk equivalent sold		Percent loss of butterfat
	Pounds	Test			Pounds	Test	
1	5,341,072	4.35	$73,320.81	$1.373	5,464,870	4.2	1.2
2	3,639,374	4.30	53,828.56	1.479	3,332,524	4.2	10.5
16	3,080,152	3.84	62,379.05	2.025	3,036,176	3.8	2.3
4	3,037,872	3.93	42,245.69	1.389	2,770,540	4.2	4.0
11	2,896,600	3.76	63,246.58	2.183	2,543,537	4.1	4.3
10	2,726,911	4.22	41,351.20	1.516	2,594,429	4.2	5.2
7	2,294,225	4.06	39,312.14	1.714	2,333,745	3.9	2.4
13	1,786,966	3.99	24,462.76	1.369	1,795,334	3.6	10.1
14	1,767,190	3.99	29,070.54	1.645	1,910,374	3.6	1.3
8	1,510,492	4.12	22,147.99	1.466	1,605,000	3.8	2.0
20	1,499,155	4.07	33,727.94	2.250	1,279,364	4.2	11.9
9	1,414,204	3.93	17,797.41	1.259	1,272,784	4.2	3.0
6	1,114,500	4.27	19,311.81	1.733	1,084,280	4.0	8.9
22	1,003,157	4.00	20,719.62	2.065	918,811	4.0	8.4
5	892,152	3.60	13,997.51	1.569	871,540	3.6	2.3
3	717,814	4.18	11,130.68	1.551	692,667	3.9	9.9
19	416,624	4.00	7,899.78	1.896	400,448	4.0	3.3
15	393,330	4.30	6,053.10	1.539	377,598	4.3	4.0
21	353,835	4.40	6,163.10	1.742	373,675	4.0	4.0
17	253,813	3.80	4,187.01	1.650	237,616	3.8	6.4
18	244,088	4.78	4,356.74	1.785	246,250	4.3	9.2
12	203,228	4.10	3,648.35	1.795	202,000	4.1	.7
Average per plant	1,663,034	4.08	$27,289.07	$1.6409	1,606,526	4.01	5.03

Prices to individual producers selling to the same plant will vary from the average price per 100 pounds of milk because of such factors as variations in test, percentage of milk in the various classes of fluid sales, the variation in the amount of milk the producer sells during the different seasons of the year, and special contracts between the producer and the plant.

Nearly all the plants buy milk on the butterfat basis. A producer selling 5% milk to plant No. 7 would have received more than $1.714 per 100 pounds. The variation in price based on the butterfat test ranged from 3 to 5 cents for each one-tenth percent change in butterfat, and depended upon the location of the plant, the usual practice in the

area, and the price of butter. In the above illustration, the producer selling 5% milk would have received $2.09 per 100 pounds if the price differential was 4 cents for each one-tenth of a pound of butterfat (5.00 — 4.06 = .94 or 9.4 tenths of a pound. 9.4 × .04 = $.376 + $1.714 = $2.090).*

The price paid for milk used for fluid milk is usually higher than the price paid for that used for fluid cream or for other fluid products. A producer having a class I base (fluid milk) will receive a higher average price for all the milk sold.

Some of the markets had price changes during the year and as a result those producers that sold a relatively large amount of milk during the period of high prices would receive a higher than average price, while those selling a relatively large amount during the period of low prices would have an average return of less than the amount shown.

A number of producers have special contracts with the distributing plants or have a special quality milk and, therefore, receive a higher than average price.

A careful analysis of the factors discussed and any others affecting the cost of milk should be made before attempting to apply the average cost of milk to plants as a basis for determining the price received by a producer for his milk.

There was a wide variation in the loss of butterfat ranging from .7% to 11.9% with the average for all plants being 5.03%. Several factors may account for the unusually high loss in some plants. The most important of these are inaccurate disposal figures, improper standardization, and loss in handling of milk in the plants and on the routes.

DISTRIBUTING COSTS PER HUNDRED POUNDS OF MILK PURCHASED

Table 2 shows the costs per 100 pounds of milk purchased, classified into (a) plant, (b) delivery and sales, (c) administration, and (d) interest on the net investment. The various items of cost included under each classification are the same for each plant and are classified further in Tables 4, 5, and 6. Table 2 also shows the price paid for milk, the total costs of distributing milk, and the total of all costs. The average cost of milk purchased was $1.640 while average distribution cost was $2.050, making a total cost of $3.691 per 100 pounds of milk purchased.

The size of plant bears an important relationship to the cost of distributing milk but because of the influence of such other factors as labor efficiency, investments, reduction in sales due to the depression, and miles per route, the relationship is not noticeable until the plants are grouped according to size, as seen in Table 3.

The first group in Table 3 purchased more than 2,000,000 pounds, the second between 1,000,000 and 2,000,000 pounds, and the third less than 1,000,000 pounds of milk per year. From the table it may be seen

*The variations in the methods of paying for milk on the butterfat basis and the variations in the proportions of milk in each price classification make it impracticable to show the cost of milk by plants for any specific butterfat test.

TABLE 2—*Summary of total costs per 100 pounds milk purchased by plants (22 West Virginia milk-distributing plants)—1933*

Plant No.	Pounds milk purchased	Distributing costs per 100 pounds milk purchased					Cost of milk per cwt.	Total all costs
		Plant	Delivery & sales	Adm.	Int.	Total		
1	5,341,072	.4446	.8084	.4069	.1207	1.781	1.373	3.154
2	3,639,374	.7364	.8607	.3072	.0896	1.994	1.479	3.473
16	3,080,152	.6428	1.0892	.4454	.1852	2.362	2.025	4.387
4	3,037,872	.6003	.8589	.4492	.1127	2.021	1.389	3.410
11	2,896,600	.5104	.4543	.3682	.0766	1.410	2.183	3.593
10	2,726,911	.6933	.8772	.6075	.1736	2.352	1.516	3.868
7	2,294,225	.7819	.8218	.5947	.1538	2.352	1.714	4.066
13	1,786,966	.5753	.7275	.4740	.0777	1.855	1.369	3.224
14	1,767,190	.6925	.6859	.4799	.1026	1.961	1.645	3.606
8	1,510,492	.6957	.6175	.4817	.2575	2.052	1.466	3.518
20	1,499,155	.9384	1.0438	.5812	.2118	2.775	2.250	5.025
9	1,414,204	.7634	.5669	.4170	.0310	1.778	1.259	3.037
6	1,114,500	.7431	.8780	.5810	.2870	2.489	1.733	4.222
22	1,003,157	.8364	.8497	.3800	.1728	2.239	2.065	4.304
5	892,152	.5498	.7229	.4229	.0218	1.717	1.569	3.286
3	717,814	.7756	1.1560	.2750	.0700	2.276	1.551	3.827
19	416,624	.9563	1.0692	.7449	.1410	2.911	1.896	4.807
15	393,330	.8237	.3958	.2105	.0839	1.514	1.539	3.053
21	353,835	.2959	1.2071	.4797	.2564	2.239	1.742	3.981
17	253,813	.8292	.6994	.2703	.1305	1.929	1.650	3.579
18	244,088	1.0559	.9140	.3246	.1897	2.484	1.785	4.269
12	203,228	.9850	.7708	.4637	.2273	2.447	1.795	4.242
Average	1,663,034	.658	.811	.448	.133	2.050	1.641	3.691

that the large plants had a low plant cost per 100 pounds of milk and a lower than average total distributing cost. Apparently the large plants effected considerable saving in the cooling, bottling, and other plant operations by greater efficiency in the use of their plant labor and plant equipment.

The group of medium-sized plants had the highest cost of distribution, the result largely of high administrative and interest costs. The high administrative cost probably is due to the fact that the medium-sized plants require about the same number of employees and the same administrative set-up as the large plants. The high investment per 100 pounds of milk purchased ($3.24) accounts for the high interest cost.

TABLE 3—*Relation between the size of plants and the cost of distributing milk by groups—1933*

Item	Pounds milk purchased			
	Over 2,000,000	1,000,000-2,000,000	Less than 1,000,000	Average of all plants
Number of plants	7	7	8	22
Average lbs. milk purchased*	3,288,029	1,442,238	434,361	1,663,034
Cost of distribution:				
(a) plant	$ .614	$ .743	$ .737	$ .658
(b) delivery and sales	.827	.766	.888	.811
(c) administrative	.432	.474	.384	.448
(d) interest on investment	.127	.155	.109	.133
Total distribution cost	2.000	2.138	2.118	2.050
Cost of milk	1.632	1.657	1.653	1.641
Total all costs	3.632	3.795	3.771	3.691
Investment 100 lbs. milk	3.19	3.24	2.52	3.14

*Individual plant data are shown in Tables 1 and 2.

TABLE 4—*Cost of distributing milk: Classification of plant expenses per 100 pounds of milk purchased by plants—1933*

Plant Number	Depreciation	Labor	Power and fuel	Supplies	Repairs	Insurance	Plant loss	Rent	Miscellaneous	Total
1	$.127	$.147	$.080	$.038	$.010	$.015	$.016	$.000	$.013	$ .445
2	.074	.268	.097	.097	.017	.010	.059	.082	.032	.736
16	.171	.231	.114	.044	.035	...	.047	...	.002	.643
4	.116	.223	.094	.069	.017	.016	.056	...	.009	.600
11	.073	.120	.069	.187	.006	.001	.046	...	.008	.510
10	.158	.213	.161	.050	.025	...	.061	...	.025	.693
7	.186	.347	.128	...	...	...	.041	...	.081	.782
13	.086	.181	.087	.049	.092	.008	.059	...	.013	.575
14	.020	.311	.159	.033	.013	.004	.020	.094	.039	.693
8	.223	.203	.121	.056	.031	...	.023	.039	...	.696
20	.215	.290	.149	.045	.092	...	.089	...	.058	.938
9	.094	.282	.037	.066	.015	.010	.054	.127	.078	.763
6	.212	.253	.136	.029	.044	...	.069	...	...	.743
22	.118	.371	.147	.086	.019	.002	.083	...	.011	.836
5	.037	.251	.095	.015	.015	...	.036	.040	.061	.550
3	.116	.332	.092	.085	.006	...	.062	.025	.058	.776
19	.120	.288	.195	.071	.047	.008	.063	.144	.020	.956
15	.076	.381	.216	...	...	...	.062	.046	.043	.824
21	.056	.103	.055	.008	.005	.018	.019	...	.032	.296
17	.083	.266	.227	...	.024	...	.066	.144	.019	.829
18	.189	.441	.151	.024	...	...	.107	.106	.038	1.056
12	.167	.271	.117	.300	.010	.008	.014	...	.098	.985
Average	.125	.234	.110	.062	.024	.006	.047	.025	.025	.658

The group of small plants had a relatively high delivery and sales cost but this was somewhat offset by their low investment in buildings, equipment, and other overhead costs which lowered their administrative and interest costs.

The variation in cost of distribution between the various groups probably would be greater if the type of service rendered and the quality of the fluid sales were shown. In some of the plants, especially in the group of small-sized plants, the equipment was inadequate to sell a high-quality product. Any attempt to increase the quality of the product sold or to increase the service rendered to the producers and consumers is likely to increase the cost of distribution in the group of small-sized plants more than in the other two groups.

The variation in the total distributing cost in the group of the large-sized plants was from $1.41 to $2.35 per 100 pounds of milk purchased; in the medium-sized plants, from $1.78 to $2.48; and in the group of small-sized plants from $1.51 to $2.91.

The managers of a number of the plants have stated that 1933 represents the low point in the total volume of fluid sales. The first few months of 1934 showed an increase in their business. The reduction in the volume of fluid sales during 1933 without any reduction in most of their costs is one of the important factors which would tend to make the cost higher than might normally be expected. This factor tends to increase the cost of distribution more in the large and medium-sized plants than in the small-sized plants because of the larger investment and overhead costs per 100 pounds of milk.

The plants having an investment capable of handling considerably larger quantities of milk should be in a position to reduce their cost per 100 pounds of milk as their volume of fluid sales increases. In fact some of the managers of plants whose business has increased during 1934 have indicated that their cost per 100 pounds of milk has been reduced slightly but that a portion or all of this reduction in the cost of distribution has been used in paying a higher price for milk.

Table 3 indicates that the cost of milk was practically the same for each group of plants. The large and the small plants are located in the same cities or area where the price paid for milk is fixed by competition or by some cooperative association. Producers usually are able to transfer from one plant to another, in the same area, if there is any great variation in the price paid for milk by the plants. The uniform price between the three groups would also indicate that the amount of milk in each class of fluid sales is approximately the same.

CLASSIFICATION OF DISTRIBUTING COSTS

In Tables 4, 5, and 6 the various distributing costs shown in Table 2 are further classified. The distributing plants in each of these tables are arranged in order of their size.

The classification of the plant costs, shown in Table 4, includes all costs incurred in the handling of milk in the plant. The items of receiving, cooling, separating, standardizing, bottling, and storing are

TABLE 5—*Cost of distributing milk: classification of delivery and sales expenses per hundred pounds milk purchased by plants—1933*

Plant No.	Depreciation	Labor	Bottles, caps, etc.	Horse and truck	Insurance	Advertising	Miscellaneous	Total
1	$.059	$.446	$.089	$.161	$.025	$.006	$.022	$ .808
2	.069	.517	.038	.152	.019	.018	.048	.861
16	.108	.460	.141	.307	...	.034	.039	1.089
4	.079	.411	.171	.149	.016	.010	.023	.859
11	.010	.206	.074	.116	.012	.024	.012	.454
10	.095	.449	.139	.149	...	.021	.024	.877
7	.035	.488	.156	.069	...	.038	.036	.822
13	.006	.396	.064	.208	.025	.028	.001	.728
14	.061	.204	.127	.250	.020	.022	.002	.686
8	.141	.203	.109	.096	...	.056	.013	.618
20	.106	.635	.071	.188	...	.001	.043	1.044
9	.079	.231	.078	.137	...	.040	.002	.567
6	.134	.329	.154	.217	...	.032	.012	.878
22	.173	.305	.081	.175	.019	.042	.055	.850
5	.098	.293	.048	.229	...	.011	044	.723
3	.061	.697	.061	.313	...	.007	.017	1.156
19	.124	.432	.101	.385	...	.001	.026	1.069
15	.025	.153	.030	.122	...	.025	.041	.396
21	.425	.218	.024	.230	.026	.062	.222	1.207
17	.049	.266	.142	.229	.013	...	...	.699
18	.031	.509	.073	.272	...	.029	...	.914
12	.115	.251	.099	.120	...	.017	.169	.771
Average	.077	.397	.102	.178	.012	.022	.023	.811

some of the operations performed in the plant. The cost item "plant loss of milk" is included in this table even though a portion of the loss occurred on the delivery routes. No records were available to show the proportion of loss occurring in the plant or on the route. The table includes the total rent paid per 100 pounds of milk even though a small amount of the rented property was used for delivery and for administration purposes. The average plant cost amounted to $.658 per 100 pounds of milk, ranging from $.296 to $1.056.

Table 5 shows the classification of the delivery and sales cost and includes all the costs of delivering the milk from the plant to the purchaser. The cost of advertising, bottles, containers, and caps is included in this table. One plant used horses and wagons exclusively in delivering milk while four used horses as well as trucks and the remaining plants used only trucks. The average cost of delivery and sales was $.881 per 100 pounds of milk with the range being from $.396 to $1.207.

Items of cost not easily classified are included in Table 6 with administrative expenses. The table includes interest paid on borrowed money and interest not paid on the net investment. The items included in this table are depreciation, cost of labor and of supplies directly incurred in the administration of the milk-distributing plant, utilities, fees, dues, travel expenses, insurance, taxes, bad debts, and miscellaneous costs. The total administrative costs average $.448 per 100 pounds of milk, the range being from $.211 to $.745.

LABOR COSTS

A study of Tables 4, 5, and 6 indicates that labor was the most important distributing cost in each classification amounting to 23.4c per 100 pounds of milk for the plant, 39.7c for delivery and sales, and 21.0c per 100 pounds for administration respectively. The total labor cost of 84.1c was 41% of the total distributing cost and amounted to approximately 1.8c per quart.

The average wage paid to all employees including the managers was $1,139.58 per year; plant employees receiving an average of $994.45; delivery and routemen, $1,048.33; and administrative employees, $1,565.04. The administrative employees include some of the highest as well as lowest-paid employees. Managers and owners received as much as $300 per month, while some of the office workers such as stenographers as little as $60 per month. The salaries were fairly uniform between plants.

A number of plants increased their wage scale and the number of employees during the year in order to comply with the "Code of Labor Provisions for the Fluid-Milk Industry." The effect of the code on the labor cost of one of the plants was as follows: the plant employees were increased from 6 to 7, the delivery and sales employees from 9 to 10, and the office employees from 3 to 4. The average wage rate of $105 per month for each plant employee and of $95 for each delivery and sales employee dropped slightly, but the wage rate of the salesroom employee was raised from $40 to $61.84 and the stenographer from $55

TABLE 6—*Cost of distributing milk: Classification of administration and interest cost per hundred pounds milk purchased by plants—1933*

Plant No.	Depreciation	Labor	Supplies, utilities	Fees, dues, travel	Insurance	Bad debts	Taxes	Interest paid	Miscellaneous	Total	Interest not paid
1	$.006	$.149	$.027	$.007	$.003	$.142	$.025	$.048	$.000	$.407	$.121
2	.011	.183	.039	.022	.009	.028	.012	.011	.001	.307	.090
16	.055	.170	.041	.024	.053	.056	.045	.000	.001	.445	.185
4	.004	.155	.026	.038	.007	.097	.016	.091	.015	.449	.113
11	.001	.116	.033	.006	.003	.119	.029	.059	.002	.368	.077
10	.063	.251	.038	.031	.030	.022	.059	.107	.007	.608	.174
7	.007	.304	.000	007	.013	.009	.054	.149	.052	.595	.154
13	.002	.368	.030	.003	.004	.039	.018	.000	.010	.474	.078
14	.001	.309	.017	.009	.029	.036	.022	.055	.002	.480	.103
8	.000	.173	.032	.012	.074	.095	.024	.072	.000	.482	.258
20	.003	.335	.050	.008	.053	.041	.017	.022	.052	.581	.212
9	.000	.260	.022	.012	.020	.046	.015	.037	.005	.417	.031
6	.069	.202	.037	.021	.088	.117	.047	.000	.000	.581	.287
22	.001	.216	.041	.015	.006	.011	.084	.003	.000	.380	.173
5	.004	.172	.034	.055	.035	.112	.010	.000	.001	.423	.022
3	.000	.100	.022	.004	.032	.036	.015	.058	.008	.275	.070
19	.010	.576	.025	.009	.000	.072	.030	.012	.011	.745	.141
15	.001	122	.016	.006	.000	.038	.011	.000	.017	.211	084
21	.007	.244	.060	.023	.009	072	060	.005	.000	.480	256
17	.004	.118	.028	.002	.000	.099	.015	.000	.004	.270	131
18	.001	.221	.022	.000	.000	.041	.039	.000	.001	.325	.190
12	.003	.223	.020	.000	.000	.132	.059	.019	.008	.464	.227
Average	.018	.210	.031	.017	.020	.070	.030	.044	.008	.448	.133

to $61.84, while the new stenographer was paid $61.84 per month. The total increase in wages due to the increase in the number of employees and wage increases amounted to $267 per month ($2,098 to $2,365 per month) or approximately 12.7%.

The wage increases occurred sometime during the month of August and continued for the remainder of the year. In this plant practically all the increased labor cost was due to the increase in the number of employees, while in some of the other plants that complied with the code the wage scale per employee increased as well as the number of employees which resulted in a relatively greater increase in the cost of labor. Additional data and information concerning the efficient use of labor is shown in Table 10 and discussed on page 24.

DEPRECIATION COSTS

Depreciation was the second largest cost, the total amounting to 22c per 100 pounds of milk, 10.7% of the cost of distributing milk, or slightly less than 0.5c per quart. The average rate of depreciation on items of investment was 7%, ranging from no charge on the land to approximately 3% on buildings, and to about 40% on some of the equipment used in the delivery of milk. Some delivery trucks that are being used daily on long routes, must be replaced every two years. Plant equipment depreciation was approximately 12% each year, depending upon the type of equipment and the amount it was used.

No depreciation cost as such was charged on rented property, except as rent. The rent paid by the plants may be used by the owner for that purpose. A study of the individual plant data indicates that the plants renting some of the property used in distributing milk had the lowest depreciation costs.

COST OF EQUIPMENT AND SUPPLIES

Equipment not only becomes obsolete and wears out but also needs constant repairs. Plants spent an average of 2.4c per 100 pounds of milk to keep the plant equipment in running condition during 1933. Delivery and sales equipment required gas, oil, tires, and repairs amounting to 16.2c per 100 pounds of milk for trucks while expenses for horses and wagons averaged 1.6c. Insurance on the buildings and equipment was 3.8c per 100 pounds of milk, and taxes, 3c.

The power and fuel used to operate the various machines including the refrigeration plant cost an average of 11c per 100 pounds of milk. This item includes such things as coal, oil, gas, water, and electricity. The cost of telephones and telegraph was 1c and was included under supplies in administrative costs, the total of this item being 3.1c. Delivery and sales supplies made up of bottles, caps, and other delivery supplies was 10.2c, while such plant supplies as salt, washing powders, brushes, etc. cost 6.2c per 100 pounds of milk purchased.

The total of all the items to maintain and operate the buildings and equipment owned by the plants, including taxes and insurance, was 57.5c per 100 pounds or approximately 1.2c per quart of milk.

OTHER COSTS

The total of other costs was 41.4c per 100 pounds of milk or approximately 0.9 of a cent per quart. These items of cost and the cost per 100 pounds were as follows: plant loss of milk, 4.7c; bad debts, 7.0c; rent paid, 2.5c; bridge tolls, 0.5*c; fees and dues, 1.7c; advertising, 2.2c; interest paid, 4.4c; interest not paid 13.3c; and miscellaneous costs, 5.1*c. Fees and dues include items of costs which were paid by the plants to have their books audited, to pay attorney fees, and dues to various organizations such as Rotary clubs. The miscellaneous or unclassified items consisted of acid, laundry, wearing apparel, and sundry other materials.

For the purpose of stating clearly the division of costs as they are shown in Tables 4, 5, and 6, the costs are further classified in Table 7.

TABLE 7—*Classification of the costs of distribution (Average of 22 plants for 1933)*

Items of cost	Average of all plants (cents)	Range high — low (cents)	Average per qt. of milk (cents)
Labor	84.1	126.0 — 44.2	1.81
Depreciation	22.0	33.4 — 8.4	.47
Building and equipment costs	57.5	86.2 — 39.5	1.24
Loss of milk	4.7	10.7 — 1.4	.10
Bad accounts	7.0	14.2 — .9	.15
Interest costs	17.7	33.0 — 2.2	.38
Advertising	2.2	6.2 — 0.0	.05
All other costs	9.8	27.7 — 2.8	.21
Total	205.0	291.1 — 141.0	4.41

DIVISION OF COSTS ON A PERCENTAGE BASIS

Another method used to indicate the importance of the various expenditures is to show the percentage each item is of the total cost. The costs in Tables 4, 5, and 6 are combined and a comparison of the various items is shown in Table 8 on a percentage basis. The data in this table explain the importance of each cost in each plant. The average cost of milk to the plants was 44.45% of all costs. The range was from 39.2 to 60.77%, but for only two plants was the cost of milk more than half of all the cost.

The relationship between the cost of milk and total cost was much more uniform than it was for the various distribution costs. For example, the range in labor costs was from 12 to 21% and for depreciation 2.3 to 12%, while the range in the percentage paid for milk was 39.2 to 60.77%.

Taxes are listed separately to indicate the percentage of total expenditures for this one item. Taxes averaged slightly less than 1% (.82%) of the total of all costs, or 3c per 100 pounds.

All taxes paid on property used by distributing plants would actually average higher than the percentage indicated if the plants owned all the land and buildings used in distributing milk. A part of

*The total of the miscellaneous items is 5.6 cents but included the 0.5 cent bridge tolls.

TABLE 8—*Classification of costs on a percentage basis: 22 milk-distributing plants, 1933 (Total costs = 100 percent)*

Plant Number	Milk	Labor	Depreciation	Supplies repairs	Horse truck	Interest	Insurance	Rent	Dues fees travel	Power fuel utilities	Taxes	Bad debts	Losses of milk	Advertising	Miscellaneous
11	60.77	12.35	2.32	7.42	3.24	3.94	0.46	...	0.16	2.96	0.80	3.30	1.28	0.66	0.28
15	50.42	21.49	3.35	1.55	4.34	2.75	...	1.50	0.20	7.57	0.36	1.23	2.03	0.81	2.41
22	47.98	20.72	6.85	4.77	4.07	4.09	0.64	...	0.34	4.46	1.95	0.26	1.92	0.98	0.98
5	47.74	21.79	4.22	2.95	6.96	0.66	1.07	1.23	1.67	3.89	0.30	3.41	1.10	0.32	2.67
16	46.16	19.62	7.61	5.72	7.14	4.22	1.20	...	0.55	3.13	1.02	1.29	1.06	0.78	0.50
17	46.10	18.18	3.80	4.63	6.39	3.65	0.37	4.02	0.05	7.13	0.43	2.75	1.84	...	0.66
14	45.53	22.88	2.29	5.03	7.11	4.37	1.47	2.59	0.25	4.66	0.61	0.99	0.57	0.63	1.02
20	44.77	25.07	6.45	4.69	3.87	4.66	1.05	...	0.18	3.46	0.35	0.80	1.79	0.03	2.84
21	43.76	14.21	12.26	1.67	6.20	6.55	1.32	...	0.57	5.02	1.51	1.81	0.49	1.54	3.09
1	43.55	23.51	6.11	4.61	5.16	5.34	1.33	...	0.38	3.23	0.80	4.50	0.49	0.19	0.80
2	42.59	27.88	4.43	5.21	4.51	2.89	0.84	2.37	1.13	3.11	0.35	0.80	1.70	0.52	1.68
13	42.47	29.32	2.91	7.08	6.54	2.41	1.13	...	0.29	2.97	0.54	1.21	1.82	0.87	0.45
12	42.32	17.58	6.70	9.86	3.61	5.80	0.19	...	...	6.85	0.57	3.12	1.48	0.40	1.54
7	42.15	28.03	5.63	3.84	2.27	7.46	0.31	...	0.17	3.15	1.31	0.21	1.01	0.93	3.53
18	41.81	27.46	5.17	2.46	6.37	4.45	0.50	2.49	...	4.27	0.43	0.95	2.51	0.67	0.48
8	41.67	16.47	11.01	5.54	2.73	9.38	2.10	1.13	0.32	3.66	0.69	2.71	0.66	1.59	0.35
9	41.44	25.48	5.70	6.40	4.50	2.34	1.02	4.18	0.40	1.52	0.50	1.50	1.74	1.34	1.97
6	41.05	18.60	9.82	5.95	5.13	6.80	2.09	...	0.49	3.50	1.11	2.76	1.64	0.75	0.31
4	40.76	23.12	5.84	7.87	4.37	5.96	1.14	...	1.14	3.40	0.46	2.84	1.63	0.28	1.19
3	40.51	29.48	4.64	5.76	8.17	3.35	0.84	0.67	0.11	3.13	0.39	0.93	1.62	0.18	0.22
19	39.44	26.96	5.29	4.66	8.04	3.18	0.17	3.00	0.18	4.99	0.61	1.50	1.30	0.03	0.64
10	39.20	23.59	8.16	6.29	3.82	7.23	0.80	...	1.16	4.61	1.51	0.57	1.57	0.54	0.94
Average	44.45	22.79	5.95	5.59	4.91	4.81	1.04	0.67	0.47	3.49	0.82	1.89	1.27	0.60	1.25

the rent received by the owners of property is used in the payment of taxes on the property they rent, and for such plants it was shown under the caption of rent paid.

The amount expended by the plants for advertising was very small, averaging 0.6 of one percent of the total cost, or 2.2c per 100 pounds of milk. All the plants except one did some advertising, the type of advertising depending on the location of the plants. Radio advertising was done by some of the plants located in the cities having a broadcasting station. Newspapers, menus, and bill boards were some of the other types of advertising used.

COMPARISONS OF RECEIPTS AND EXPENSES

All the milk purchased by the plants is either lost or sold in some form. Of the milk purchased approximately 53% was sold as fluid milk, 19% as fluid cream, 23% as other products, and the remaining 5% lost.

The prices received for each of these products varied considerably, the price for fluid milk usually being higher than the price received for cream and other products on a milk equivalent basis. The average cost and the average gross sales value per 100 pounds of milk purchased by plants is shown in Table 9, including the price per unit of product handled. Unit as used here means the total number of containers sold (see definition on page 5). For example, one plant sold the following number of units during 1933:

Gallons of milk	10,174
Quarts of milk	451,246
Pints of milk	279,710
Half-pints of milk	217,038
Gallons of cream	11,462
Quarts of cream	10,256
Pints of cream	5,484
Half-pints of cream	82,953
Gallons of other products	719
Quarts of other products	50,565
14-ounce packages	27,748
Total Units	1,147,355

The average-sized unit contains slightly more than one quart of milk-equivalent, as is shown in Table 14. The cost or gross sales value per quart can be obtained by dividing the cost or gross sales value per 100 pounds by 46.5, which is the approximate number of quarts per 100 pounds of milk. The spread shown in Table 9 is the difference between the gross sales value per 100 pounds and the amount paid for milk (see definitions). For example, plant No. 12 paid $1.795 per 100 pounds and sold it for $4.127. The difference between $4.127 and $1.795, or $2.332, was the spread retained by the plant to pay for the various services it rendered to the consumer. In this plant the actual cost of the services was $2.447, as shown in Table 2.

The gross sales value was obtained for only 17 of the 22 plants. For these 17 plants the gross sales value per 100 pounds was $3.568, and the average total cost, $3.674 (the average cost for all 22 plants was $3.691). Thus the average operating loss to these 17 plants was $.106 per 100 pounds of milk purchased. The cost data, however, include interest on investment, which was $.118 per 100 ($.133 for all plants). When this interest is deducted from the cost the 17 plants show a profit of $.012 per 100 pounds, which is less than one-half of one percent return on their investment. The average investment for the 17 plants was $2.85 per 100 pounds of milk. To state this in another way, these 17 plants made enough money to pay all their current expenses, including cost of milk; set aside a reasonable amount of money to take care of depreciation, plant loss of milk, and bad accounts; and have enough money left to pay 0.44% on their investment. A net return of 1.2c per 100 pounds of milk is equal to approximately .026c per quart; or a plant made a profit of 1c for every 39 quarts of milk-equivalent sold.

TABLE 9—*Comparison of cost, receipts, and spread for 17 plants, and the cost per unit for 22 plants—1933*

Plant No.	Per hundred pounds of milk purchased				Per unit	
	Total costs	Receipts	Cost of milk	Spread	Costs (cents)	Receipts (cents)
1	$3.154	$3.038	$1.373	$1.665	9.22	8.89
2	3.473	3.228	1.479	1.749	10.97	10.20
16	4.387	4.206	2.025	2.181	9.63	9.23
4	3.410	3.642	1.389	2.253	7.57	8.08
11	3.593	3.813	2.183	1.630	9.60	10.21
10	3.868	....	....	....	7.54	....
7	4.066	3.789	1.714	2.075	8.12	7.58
13	3.224	3.262	1.369	1.893	7.81	8.01
14	3.606	3.577	1.645	1.932	6.91	6.85
8	3.518	....	....	....	14.85	....
20	5.025	4.645	2.250	2.395	9.93	9.17
9	3.037	3.024	1.259	1.765	6.74	6.72
6	4.222	....	....	....	8.79	....
22	4.304	4.127	2.065	2.062	7.39	7.08
5	3.286	2.655	1.569	1.086	7.91	6.39
3	3.827	3.510	1.551	1.959	8.07	7.40
19	4.807	3.774	1.896	1.878	8.55	6.75
15	3.053	....	....	....	8.13	....
21	3.981	4.216	1.742	2.474	12.32	13.69
17	3.579	....	....	....	6.01	....
18	4.269	4.457	1.785	2.672	10.04	10.48
12	4.242	4.127	1.795	2.332	8.22	8.00
Average 17 plants	3.674	3.568	1.641	1.927	8.721*	8.480

*Average of 22 plants.

The spread for the 17 plants was $1.927 per 100 pounds or 4.14c per quart. The average price paid for milk was $1.641 per 100 or 3.53c per quart. The average gross sales value was 7.67c per quart. This was considerably under the average price received for fluid milk only, indicating that the selling price of cream and other products was less than the price received for wholesale or retail fluid milk.

Actual gross receipts were .15c per quart less than the gross sales value because of the accounts not collected. These uncollected accounts have been included as a cost and, therefore, have been included in the receipts. When the .15c per quart was deducted from the gross sales

value of 7.67c per quart, the gross receipts were equal to 7.52c. Deducting this same item from the total costs, the costs per quart were 7.49c. When these changes are made, the profit of .026c per quart (actually .0258), 1.2c per 100 pounds of milk, or the 0.44% net return on the investment, remain the same.

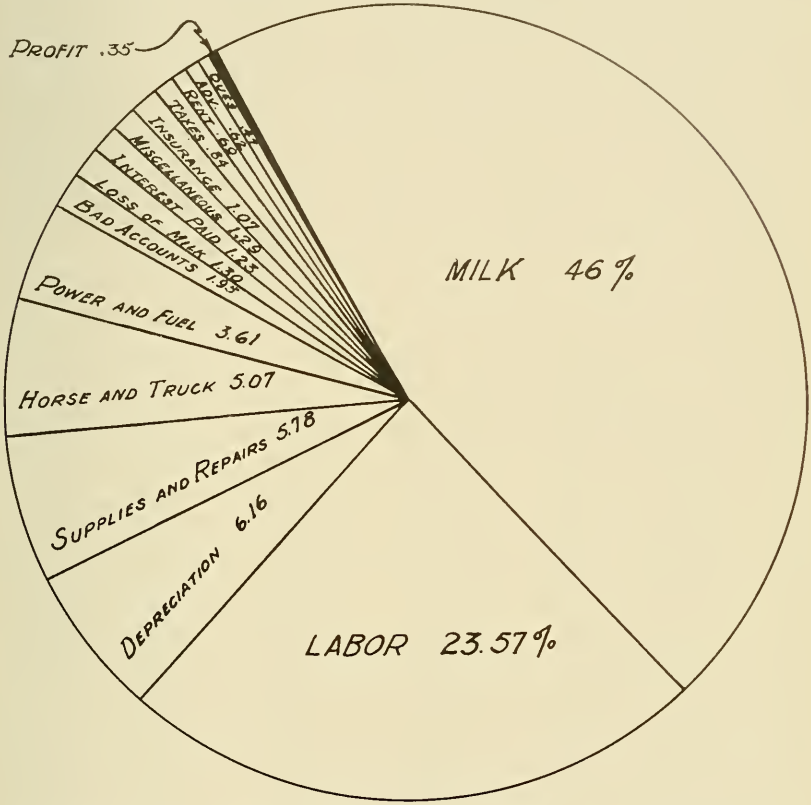

FIG. 2—Where the consumer's dollar goes (Summary of milk-distribution costs of 17 cooperating plants in 1933)

DIVISION OF THE CONSUMER'S MILK DOLLAR

The gross sales value is only slightly different than the sum of the cost of milk and the cost of distribution (gross sales value, $3.568; cost of milk and distribution, $3.674), and, therefore, the distribution of the consumer's dollar does not differ greatly from the data shown in Table 8. Figure 2, however, shows how the consumer's milk dollar was spent by the 17 distribution plants in 1933. The chart does not include interest not paid but indicates that the distributing plants retained 0.35% of the consumer's dollar to pay interest on the net investment.

As has been stated previously, the 0.35% profit of the consumer's dollar is equal to 0.44% return on the investment.

The distributing plants paid 46.0% of the consumer's dollar for milk, retaining the remaining 54.0% to pay operating costs and for profits. The chart indicates that 23.57% of the gross sales value was spent for labor, 6.16% for depreciation, 5.78% for supplies and repairs, 5.07% for horses and trucks, and 3.61% for power and fuel. Of the remaining items 1.95% of the consumer's dollar was not collected and is shown under the caption of bad accounts. If this item of uncollected accounts were eliminated and actual collections used to show the distribution of the consumer's dollar, the chart would be changed slightly. The proportion of the consumer's dollar actually collected by the distributing plants and used for buying the product would be 46.92% instead of 46.0%. The percentage change of the other items would be very small except for the item of profit which would remain the same if the item of bad debts were eliminated.

TABLE 10—*Cost of labor per 100 pounds of milk and efficiency of labor in 22 plants—1933*

Plant No.	No. of employees	Cost of labor per 100 lbs. milk	Average yearly wage per employee	Lbs. milk per employee	Units per employee	Units per routeman per day
1	37.9	$ .742	$1,044.54	140,925	48,156	230
16	24.5	.861	1,082.22	125,720	57,279	274
2	23.0	.968	1,531.96	158,233	50,059	243
10	22.5	.913	1,105.96	121,196	62,163	365
7	20.1	1.139	1,300.67	114,141	57,082	305
4	19.7	.789	1,216.38	154,207	69,417	393
20	15.0	1.260	1,259.11	99,944	50,611	297
13	14.5	.945	1,164.36	123,239	50,205	285
14	14.5	.824	1,007.87	121,875	63,665	389
11	12.0	.442	1,071.24	241,383	90,176	494
9	9.0	.773	1,216.20	157,134	70,710	498
8	8.5	.579	1,029.81	177,704	42,093	280
5	8.0	.716	797.37	111,519	46,336	290
22	7.7	.892	1,158.20	130,280	75,956	534
6	7.5	.784	1,166.59	148,600	71,303	419
3	6.0	1.129	1,350.00	119,636	56,741	233
19	5.5	1.296	981.82	76,173	42,358	319
21	3.5	.565	838.62	101,096	31,143	199
15	3.0	.656	860.00	131,100	49,180	404
18	3.0	1.171	953.38	81,363	34,594	284
17	2.0	.650	826.00	126,906	75,738	414
12	1.5	.745	1,010.05	135,485	69,906	575
Average	12.1	.841	1,139.58	131,438	57,493	316

LABOR EFFICIENCY

The cost of labor depends upon the efficiency of the labor as well as the price paid for such labor. Table 10 shows the average salaries paid to employees and the efficiency of their labor. Three measures of labor efficiency are shown: (1) total pounds of milk handled per year per employee, (2) total units sold per employee, and (3) number of units sold per day per routeman. In general the plants having the highest wage scale had the highest labor cost per 100 pounds of milk as indicated by plant Nos. 2, 3, and 7 in Table 10. Three of the plants, how-

ever, paying higher than average wages had lower than average labor costs because of the large quantity of milk handled per employee. These plants were Nos. 4, 6, and 9.

A study of Table 10 indicates that the plants employing a large number of persons did not have a lower labor cost or make more efficient use of their labor than did the plants employing fewer than six employees. In fact the plants employing fewer than six show that their routeman delivers more units per day than the large plants. The reasons the plants with less than six employees did not have a higher labor cost and appeared to make as efficient use of their labor as the larger plants may be accounted for by one or more of the following: (1) the small-sized plants had a lower wage scale; (2) a few of the small-sized plants were located in the small cities, where the routes are more concentrated than in the large cities, which enables the delivery men to deliver more units per day; (3) a larger share of the work was done by the owner, who worked longer hours and spent less time on overhead operation such as management and bookkeeping; (4) many of the employees in the small plants were required to work seven days per week, while in the larger plants they worked only six days.

A wide variation can be noted in the number of units delivered per day per employee. Several factors may account for this wide variation. Every plant except one sold some milk both wholesale and retail. Plants having a high percentage of wholesale trade usually had the largest number of units delivered per day per routeman. Wholesale stops usually were more concentrated and took more of the small units such as pints and half-pints of milk and cream than retail stops. Plant No. 22 sold all its milk at wholesale prices and had one of the highest number of units delivered per routeman.

Many of the plants had long routes serving several nearby towns. This had a tendency to decrease the number of customers served and number of units delivered by one routeman. Plant No. 16 is of this type. For other plants the routes were scattered over a large area because of the large number of distributors operating in the city. A large part of the milk consumed in some cities was sold by producer-distributors who delivered milk on the same streets served by one or more of the distributing plants. There were instances where 8 or 10 milk trucks delivered milk on the same street each day. This duplication of routes tends to increase cost of labor and repairs and upkeep of delivery equipment. Whether the duplication of services is greater in the delivery of milk than it is in other types of similar business such as retail routes of groceries may be questioned, but this duplication does result in increased distribution costs.

The cost of delivering milk was increased in nearly all the cities in West Virginia because of the topography of the streets. Many of the routes included steep, crooked, or dead-end streets. These factors made it necessary for the trucks to do considerable "back tracking", which lengthened the routes, increased the cost of repairs and of gasoline, and reduced the number of units that were delivered by one routeman.

Another factor that decreased the number of units per routeman was the number of steps the routeman climbed in order to reach the front door of a large number of consumers.

Division of labor is less marked in the plants with fewer than 6 employees than in the plants employing more than 6. In the large plants each employee usually was responsible for one or two specific operations: one employee was made responsible for the receiving of milk, another for the cooling and bottling. In the smaller plants an employee found it necessary to do any one or all of the types of operations necessary in distributing milk even to the extent of working part-time in the plant and part-time delivering milk. The employees in the large distribution plant usually have well defined routes which are handled by the same routeman, while in the small plants the routes are not as well defined and a delivery man may find it necessary to deliver milk on any one of the plant's routes.

SIZE OF UNITS AND COSTS PER UNIT

Milk-distribution plants sell their products in various-sized units ranging from one half-pint to two or three gallons. None of the plants had an accounting system which showed the actual cost for each size of unit sold. Some of the costs in distributing a half-pint are exactly the same as they are for a quart. The cost of caps is an example of this type of cost, as a cap put on a half-pint bottle costs exactly the same as a cap put on a quart bottle. Some of the costs such as standardization, cooling, and pasteurizing, etc., vary directly with the size of the unit sold.

A decrease in the size of unit sold increases the distributing cost per 100 pounds of milk but the cost per unit decreases (see Table 11). For example, an employee usually can bottle more pints than quarts in an hour, but the total pounds of milk bottled into pints will be less than that into quarts. A delivery truck can carry more pints and half-pints than quarts but in so doing it will carry a smaller quantity of milk. This variation in the size of units handled by plants is one of the factors affecting the cost of distributing milk. The plants selling a large number of small units had a lower than average distribution cost per unit but a higher than average distribution cost per 100 pounds of milk, as shown in Table 11.

The plants are divided into three groups: the first group is composed of those plants which sold units of larger than average size; the second group is composed of plants which sold average-sized units; and the third group the small units. The cost figures per unit and per 100 pounds of milk do not include the cost of milk. It may be seen from the table that the distributing cost per unit increases as the size of the unit increases, while the cost per 100 pounds of milk decreases. The cost per unit in the eight plants whose average size of unit contained 2.72 pounds of milk-equivalent had a unit cost of 5.02c whereas the eight plants whose average size of unit was only 1.81 pounds of milk had a unit cost of only 4.40c; but the distribution cost per 100 pounds of milk

was $1.781 for the former group and $2.286 for the latter. Both labor and depreciation costs per 100 pounds of milk increased as the average size of the unit became smaller.

A plant in order to obtain the same net returns from a quart and from a pint or half-pint must sell the smaller units at a relatively higher price. This relative increase in price could not be determined from the data available but the relationship in price should be approximately as follows: quarts 10c, pints 6c, half-pints 4 to 4½c.

TABLE 11—*Cost of distribution compared on the basis of size of unit sold: 22 milk-distributing plants in West Virginia in 1933*

Item	Large units	Medium-sized units	Small units	Weighted average
1. Number of plants	8	6	8	22
2. Pounds of milk equivalent per unit*	2.72	2.07	1.81	2.29
3. Range in size of unit (lbs.)	3.43-2.25	2.24-2.00	1.99-1.57	3.43-1.57
4. Milk purchased per plant (lbs.)	1,943,423	2,001,962	1,128,448	1,663,034
5. Distribution costs per unit (cents)	5.02	4.67	4.40	4.70
6. Distribution costs per 100 pounds milk	$1.781	$2.222	$2.286	$2.050
7. Labor costs per 100 pounds milk purchased	0.761	0.900	0.897	0.841
8. Depreciation cost per 100 pounds milk purchased	0.154	0.241	0.304	0.220
9. Distribution cost per 100 pounds milk equivalent sold	$1.840	$2.256	$2.425	$2.123

*Individual plant data are shown in Table 14.

The pounds-of-milk equivalent sold per unit by individual plants is shown in Table 14. The table also shows the percentage of the total product sold as whole milk. This figure is not the same as that shown on page 21 under receipts and expenses, since it is based on the pounds-of-milk equivalent sold rather than on the pounds of milk purchased. The plants selling a larger than average percentage of their product as whole milk usually sold the smaller number of pounds of milk equivalent per unit. Plants Nos. 17, 19, and 22 are good examples. Plant No. 17 sold 81.4% of the total milk-equivalent sold as fluid milk and had 1.57 pounds of milk-equivalent per unit. On the other hand plant No. 22 sold only 21.9% of the total milk-equivalent as fluid milk and 77% as fluid cream and had 3.43 pounds of milk-equivalent per unit, which was the largest of any of the plants included in this study.

Seventy-nine and four tenths percent of the total number of units sold as fluid milk but represented only 56.1% of the total milk-equivalent sold, while 7% of the units sold were sold as fluid cream, which represented 20% of the milk-equivalent sold. The remaining 13.6% of the units sold as other products represents 23.9% of the total milk-equivalent sold.

The average-sized unit of whole milk contained 1.63 pounds of milk, which is equivalent to .756 of a quart. The cream sold averages 6.46 pounds of milk-equivalent per unit or .585 of a quart of cream. The other products average 4.03 pounds of milk-equivalent per unit.

Table 11 shows also the distributing cost per 100 pounds based on the pounds of milk-equivalent sold and indicates a greater variation in the distributing cost between the three groups than does the distribution cost based on the pounds of milk purchased. The difference between the distribution cost based on the pounds of milk purchased and the pounds of milk-equivalent sold was $.059 for the plants that sold large units, $.034 for the plants that sold medium-sized units, and $.139 for the plants that sold small units.

TABLE 12—*Comparisons of investment per hundred pounds of milk purchased, and cost of distribution in 22 plants—1933*

Item	Large investment	Medium investment	Small investment	Average
1. Number of plants	8	7	7	22
2. Range in investment*	$5.89-4.00	$3.99-2.50	$2.49-0.77	$5.89-0.77
3. Average investment per hundred	$4.80	$3.04	$2.03	$3.14
4. Cost of distribution per hundred	$2.35	$2.08	$1.78	$2.050
5. Depreciation cost per hundred	$0.326	$0.226	$0.128	$0.220
6. Milk per plant (lbs.)	1,107,987	2,283,201	1,677,201	1,663,034

*Individual plant data are shown in Table 14.

A COMPARISON OF INVESTMENTS AND COSTS

The total investment is an important factor in distribution cost. Depreciation, repairs, supplies, insurance, and taxes must be paid on the investment. Table 12 illustrates the effect which a small investment has in reducing the distribution cost per 100 pounds of milk. The group of plants with an average investment of $4.80 per 100 pounds had a distributing cost of $2.35, while that group of plants which had an average investment of $2.03 had a distribution cost of $1.78 per 100 pounds. Six out of the eight plants placed in the high-investment group had the highest distribution cost per 100 pounds of milk and all the plants in this group had a higher than average distribution cost, while only one of the 8 plants in the low-investment group had a distribution cost above the average of all plants.

The data in Table 12 show that the plants having a high investment per 100 pounds of milk purchased were smaller than the average-sized plant. Some of these small plants had a relatively large investment in land and buildings when compared with the other plants. The large investments in proportion to their size increased their depreciation cost which resulted in a high cost of distributon for this group of plants. The cost of depreciation in the plants that had relatively large investments was 32.6c per 100 pounds of milk purchased and was approximately two and one-half times the depreciation cost in the plants which had a small investment. In addition to this increased depreciation cost the cost of insurance, repairs, taxes, and other items tended to make the cost of distribution of the plants in the large investment group greater than in the other two groups of plants shown in Table 12.

The plants in the first group had too large an investment for the amount of milk they distributed during 1933. A number of these plants may have reduced the quantity of milk sold by them over previous years and may find that when milk consumption increases, their costs will decrease. On the other hand the plants having a small investment per 100 pounds may be operating at capacity and cannot increase their business without increasing their investments.

The 22 plants included in this study had an average investment of $52,255.45 in land, buildings, equipment, supplies, and accounts. A portion of the investment in land and buildings was not owned by the plants but rented to them. The value of the rented property was included in the above item to indicate the total amount of capital necessary to operate a milk-distributing plant. Ten of the plants paid some rent as was shown in Tables 4 and 8. The total value of the rented property was $83,976 for the 10 plants.

TABLE 13—*Total investments in owned and rented land, buildings, equipment, and other assets: 18 milk-distributing plants—1933*

Type of investment	Average per plant	Per 100 lbs. of milk purchased	Percentage of total investment
1. Land owned	$ 5,080.61	$ .30	9.9
Buildings owned	14,303.34	.84	28.0
Land and buildings rented	4,665.34	.28	9.1
Total land and buildings	$24,049.29	$1.42	47.0
2. Plant equipment	$ 9,878.40	$ .59	19.3
Delivery equipment	3,298.00	.19	6.4
Administrative equipment	678.84	.04	1.3
Total equipment	$13,855.24	$ .82	27.0
3. Notes and accounts receivable (1)	$ 9,371.55	$ .55	18.3
Supplies (2)	2,023.89	.12	4.0
Miscellaneous (3)	1,869.28	.11	3.7
Total	$13,264.72	$ .78	26.0
4. Total for 18 plants	$51,169.25	$3.02	100.0
5. Total for 22 plants	$52,255.45	$3.14	...

(1) Notes and accounts receivable include only those accounts that are past due.
(2) Supplies include such items as bottles, cans, caps, and other material used in the operation of the plant.
(3) Miscellaneous items consist of prepaid insurance, taxes and licenses, loans to producers, cash and other investments not classified.

In addition to the rented property a large proportion of the investment consisted of borrowed capital. The rate of interest paid on this borrowed money was approximately 7% with the cost per 100 pounds milk sold shown in Table 6. The amount of borrowed money was equal to approximately 18% of the total investment.

Table 13 classifies the total investment of 18 of the 22 plants. The table indicates that 47% of the total capital investment was in land and buildings. The investment in land owned by the plants was $5,080.61, buildings owned $14,303.34, and land and buildings rented $4,665.34 per plant, the value of this investment being $1.42 per 100 pounds of milk purchased during 1933.

The average value of the plant equipment was $9,878.40 per plant; delivery and sales equipment, $3,298.00; and of the administrative equipment, $678.84. The total value of the equipment was $.82 per 100

pounds of milk and equal to 27% of the total investment. The value of the equipment does not represent the original cost but the average value during 1933. In all the plants the original cost of the equipment was considerably higher than the amounts in Table 13. Although complete data were not available which would give the original cost of the equipment, a fair estimate based on the data available from a number of the plants would indicate that the original cost would be approximately $18,000 to $20,000 per plant.

Of the remaining investments notes and accounts receivable were $9,371.55, supplies $2,023.89, and miscellaneous items $1,869.28 per plant, the total of these items amounting to $.78 per 100 pounds of milk or 26% of the total investment.

TABLE 14—*Other factors affecting cost of distribution. Investment, trips per bottle, milk per unit, percentage of milk-equivalent sold as fluid milk, and percentage sold wholesale, 1933*

Plant No.	Investment per cwt. milk purchased	Distributing cost per hundred lbs.	Trips per bottle	Pounds milk-equivalent sold per unit	Percentage of milk-equivalent sold as fluid milk	Percentage of milk and cream sold wholesale
10	$5.89	$2.352	23.5	1.85	62.7	56
6	4.79	2.489	19.3	2.03	54.6	61
21	4.34	2.239	9.8	3.43	21.9	90
8	4.29	2.052	17.9	1.61	69.4	..
18	4.22	2.484	22.2	2.37	55.5	..
7	4.20	2.352	16.0	2.03	63.3	75
12	4.06	2.447	24.0	1.93	49.1	..
19	4.00	2.911	69.2	1.72	72.5	75
20	3.93	2.775	34.4	1.69	65.6	49
17	3.61	1.929	21.9	1.57	81.4	..
14	3.49	1.961	17.9	2.07	44.9	71
16	3.09	2.362	18.4	2.16	51.7	69
22	2.93	2.239	49.9	1.57	75.7	100
1	2.83	1.781	28.7	2.99	47.6	..
4	2.66	2.021	9.3	2.03	82.5	71
9	2.46	1.778	48.5	2.00	..	..
2	2.40	1.994	47.6	2.89	47.6	70
11	2.24	1.410	47.4	2.35	70.3	..
15	1.91	1.514	59.2	2.56	45.0	..
3	1.87	2.276	37.6	2.03	74.6	74
13	1.29	1.855	38.8	2.47	49.3	69
5	.77	1.717	65.9	2.35	58.4	..
Average	$3.14	$2.050	22.8	2.29	56.1	69.6

The investment in accounts receivable did not include current acounts unless they were more than one month past due. That is, in determining the investment in this item, the total accounts receivable on December 31, 1933, was obtained and the outstanding accounts for the month of December, 1933, were deducted. The same procedure was used to determine the investment in this item at the beginning of the year (January 1, 1933). The average of the beginning and closing inventory with the above deductions was used to obtain the investment in accounts receivable.

The investment in supplies consisted of such items as bottles, cans, caps, and other material used in the operation of the distributing plant. The miscellaneous items included prepaid items such as taxes, insurance and licenses, loans to producers, cash and other unclassified investments.

The average investment for the 18 plants was $3.02 whereas the investment for all 22 plants was $3.14 per 100 pounds of milk. The investment or value of the total capital used by individual plants is shown in Table 14. The table shows that the range in investment was from $5.89 to $.77. The table also compares the investment with the cost of distributing milk and indicates that 9 of the 11 plants having an investment that was greater than the average, had higher than the average distributing costs. In general the plants having the large investments were equipped to distribute considerably more milk than they handled during 1933.

BOTTLE LOSSES

Bottles constituted one of the important costs in distributing milk, the average cost of each bottle being approximately 5c. The average number of trips per bottle for the 22 plants was 22.8, varying from 9.3 to 69.2, as is shown in Table 14. With a cost of 5c per bottle and each bottle making 22.8 trips before it must be replaced, the bottle cost amounts to more than .2 of one cent for each unit sold. This means that for each bottle of milk that the consumer buys he pays 1/5 of a cent for the container. The above figure is based on the original cost of the bottle and does not include interest charges.

Four measures have been taken by a number of plants to reduce this cost. First, through a system of bottle exchanges with other plants and producer-distributors each plant attempts to have its own bottles returned to it in exchange for the bottles belonging to other distributors. This method is proving effective in the exchange of bottles between the various distributors located in the same city.

The second method lies in charging each customer for the bottle at the time the purchase is made and refunding this amount when the bottle is returned. The usual price charged in such cases is 5c. This method is effective in having the consumer return the bottle to the plant. In the third method practically all the plants have their own bottle trade-mark registered to prevent other distributors from using their bottles. This is proving effective in exchanging bottles between distributors and in preventing some of the small producer-distributors from using the bottles of the plants and large producer-distributors. Fourth, a number of the plants are making the routemen responsible for the return of the bottles on their routes, the distributing plant paying the routemen a premium for the return of any excess bottles or penalizing them for any excessive loss.

MILK AND CREAM SOLD WHOLESALE

Although complete records of the percentage of total sales that were either wholesale sales or retail sales were not available from all plants, the amount sold by 13 plants at wholesale stops is shown in Table 14. The data indicate that 12 of the 13 plants sold more than half their milk to wholesale stops. There are too many other important

factors entering into the cost of distribution of milk to make any comparison between the cost of wholesale and retail distribution.

SOME COMPARISONS WITH PLANTS IN OTHER STATES

Data on the cost of distributing milk, spread, and profit are available from other plants located in several states. Although direct comparisons cannot be made for all costs, it is possible to compare several items which may be of interest. The comparisons are shown in Table 15 and are made as uniform as possible for the items shown. Some of the data from the other states were reported on the 100 pounds of milk basis and were converted to the quart basis by dividing the figure by 46.5. The New York City plants *(4)* and the up-state New York plants *(3)* data are for the month of August, 1933, while the Ohio data *(5)* are for the first three months of 1933 and for September, 1934.

TABLE 15—*Comparisons of costs and spread between distribution plants in West Virginia, New York, Ohio, and Borden plants*

Item	22 W. Va. plants 1933	19 N. Y. City plants[3] Aug. 1933	21 up-state New York plants[3] Aug. 1933	Borden plants for 1933[3]	Ohio Jan. Feb. Mar. 1933[3]	Ohio Sept. 1934[3]
1. Cost of product (cents per qt.)	3.53	4.44	4.30	4.00	2.79	4.59
2. Total operating cost (cents per qt.)[1]	4.12	4.21	3.34	4.97	...	...
3. Gross sales value (cents per qt.)	7.67	8.65	7.83	9.10	7.93	10.48
4. Spread (cents per qt.)	4.14	4.21	3.53	5.10	5.14	5.90
5. Profit (cents per qt.)	.02	.004	.19	.13	...	...
6. Returns on investment (percent)[2]	.44	.15	4.9	3.16	...	...
7. Profit on sales (percent)	.35	.04	2.5	1.4	...	...
8. Cost of product (% of sales)	46.0	51.3	54.9	43.7	35.2	43.8
9. Cost of labor (cents per qt.)	1.81	2.00	2.00	2.37	...	...
10. Cost of depreciation (cents per qt.)	.47	.32	.32	...	...	...
11. Cost of bad debts (cents per qt.)	.15	.04[4]	.04[4]	...	...	...
12. Cost of advertising (cents per qt.)	.05	.08[4]	.08[4]	.06	...	...
13. Cost of taxes (cents per qt.)	.06	...	...	.11	...	...
14. Average rate of interest	7.0	6.3	7.6	...	...	...
15. Investment per qt. (cents)	6.75	5.39	4.21	...	...	...
16. Labor cost of operating cost (percent)	41.0	56.0	55.7	47.7	...	...

NOTES:
[1]Does not include interest on investment.
[2]Does not include good-will investment.
[3]See literature cited on page 36.
[4]April, 1932, instead of August, 1933.

COST OF THE PRODUCT

The figures for West Virginia as presented in the preceding tables show that the cost of the milk used by the plants was $1.641 per 100 pounds of milk or an average of 44.45% of the total costs. In 19 New York City plants the cost of the milk was equal to 4.44c per quart or 51.33% of the total cost to the plant during August, 1933. For 21 up-state plants in New York the cost was 4.30c per quart or approximately 57% of all costs during August, 1933. The cost of milk in these two cases represents the cost of the product at their country plants. Ohio plants for the first 3 months of 1933 paid $1.279 per 100 of 4% milk; for the first 3 months of 1934, $1.799; and for September, 1934, $2.136. This represents 35.15, 40.6, 43.82%, respectively, of the consumer's dollar going to the producer. The cost of milk at the receiving station for the Borden plants was 4c per quart or 43.89% of the total costs *(1)*. The Borden figures are for the year 1933.

SPREAD

The 19 New York City plants had a spread of 4.211c per quart and the 21 plants of up-state New York 3.53c per quart during August, 1933; for the plants in Ohio it was $2 393 per 100 pounds of milk for the first three months of 1933, $2.633 for the first 3 months of 1934, and $2.739 for September, 1934, while the 17 plants in West Virginia show a spread of $1.927 per 100 pounds or 4.14c per quart during 1933. The Borden plant figures indicate a spread of 5.1c per quart. The average selling price for all products was equal to 9.1c per quart for the Borden plants. The New York City plants' selling price was 8.651c, and up-state New York 7.83c for August, 1933, while in West Virginia the average selling price was 7.67c per quart.

Two factors to consider in a study of this spread are first, the figures for New York and Borden's plants represent the cost of the product at the country plants. Transportation cost to pasteurizing plants is an item of expense that does not enter into the cost of selling milk in West Virginia. The second item is that interest not paid on investment is omitted from the data for plants from other states. The studies of the New York and Borden plants were for the purpose of determining net profits rather than costs and for that reason interest not paid was excluded.

The item of interest not paid is omitted from the West Virginia plants in determining net returns on investment as shown in Table 13.

DEPRECIATION

The rate of depreciation for the 22 West Virginia plants has been shown to be 7% on the total net investment. The New York City data indicate an average rate of depreciation of 6.3 percent, and data for the up-state plants, 7.6% of the total investment. Comparable figures for the other states are not available; however, the cost of depreciation

supplies and repairs represent 17.12% of all costs in the case of the Borden plants, while the sum of these three items for the West Virginia plants was 16.45%. Depreciation cost represents 7.6% of the total distribution cost of the New York City plants, 9.1% of the up-state New York plants, and 10.7% of the cost of the West Virginia plants.

LABOR

The data for the New York plants indicate that the average wage rate including commission was equal to $39 per week *(2)* for 1933 or 56% of the distributing costs in New York City, and 55.7% for the up-state New York plants for August, 1933. The West Virginia labor costs represent only 41% of the distribution cost and 22.79% of all costs, and a wage rate of $21.91 per week. The Borden figures indicate that their plants spent 47.7% of all costs for labor. On the quart basis, labor cost for up-state New York plants was 2 cents per quart, for Borden's 2.37c, and West Virginia plants 1.81c per quart.

BAD DEBTS

The plants in New York had a cost of .04c per quart because of uncollected accounts whereas this item for the plants in West Virginia constitutes a cost of 7c per 100 or .15c per quart. The New York figure is the same for both up-state and New York City plants and is the figure for April, 1932.

ADVERTISING

The plants in New York spent .08c per quart for advertising, Borden's plants .06c, and the plants in West Virginia approximately .05c. The cost of advertising in West Virginia was 0.6% of all costs, whereas the figures for the New York plants on advertising were based on their expenditures for the month of April, 1932, and included the New York City and up-state plants.

INVESTMENT

The average investment per quart of milk was 6.75c for the West Virginia plants, 5.39c for the New York City plants, and 4.21c for the up-state New York plants.

DISPOSAL OF PRODUCTS

The data for the West Virginia plants show that 56.1% of the fluid sales was disposed of as fluid milk, 20% as cream, and 23.9% as other products. The corresponding data for the New York City plants for the month of August, 1933, are 61.7, 21.7, and 16.6% respectively. Up-state New York plants' disposal data show 53.3% as fluid milk, 23.5% as cream, and 23.2% as other products.

SUMMARY

A study of the 1933 records from 22 milk-distributing plants in West Virginia indicates that the average cost of distributing milk was $2.05 per 100 pounds of milk purchased. The same 22 plants paid an average of $1.641 per 100 for the milk used for fluid-sales purposes. The total cost of milk and cost of distributing averaged $3.691 per 100 pounds or 7.94c per quart. The cost of milk to the various plants ranged from $1.259 to $2.250 per 100 and the cost of distribution from $1.41 to $2.91, whereas the total of these two items ranged from $3.053 to $5.025 per 100 pounds. The cost of milk to plant did not represent the price paid the producer but was the cost of the milk delivered at the plant.

Labor was the largest item of distributing cost, amounting to 84.1c per 100 or equal to 41% of the distributing cost. The cost of labor for the individual plants varied from the average figure because of the variation in the efficiency of the labor. Efficiency of labor was measured by the number of units and pounds of milk handled per employee per year.

Depreciation costs averaged 22c per 100 pounds of milk, the range being from 8.4c to 33.4c. This item varied considerably for the individual plants because of the (1) rate of depreciation charged, (2) kind and amount of investment per plant, (3) amount of property rented, and (4) volume of milk handled. The plants that rented the land and buildings used in distributing milk had the lowest cost of depreciation.

Supplies, repairs, taxes, insurance, and such other items incurred in the care and operation of the buildings and equipment cost 57.5c per 100 pounds of milk.

The remaining distribution costs for the 22 plants were as follows: loss of milk, 4.7c; bad debts, 7.0c; interest costs, 17.7c (4.4c of which was paid on borrowed capital); advertising, 2.2c; and all other costs, 9.8c per 100 pounds of milk purchased.

The cost of distribution varied from plant to plant because of (1) size of plant; (2) size of unit sold; (3) investment per 100 pounds of milk purchased; (4) cost of labor; (5) efficiency of labor; (6) loss of milk; (7) bad accounts; (8) efficiency of routes; and (9) cost of administration. Costs may be reduced in a number of the plants by increasing the efficiency of one or more of these items. A number of the plants had an investment large enough to handle considerably more milk than was handled in 1933. If it were possible, in these plants, to increase their fluid sales, the cost of depreciation, of administration, and of labor per 100 pounds of milk would be reduced. Concentration of routes will reduce delivery and sales costs by reducing the cost of labor, repairs, gas, and oil. Any method whereby the milk losses, bad accounts, bottle losses, and other items can be reduced, will tend to reduce the cost of distribution.

An average of 1,663,034 pounds of milk was purchased in 1933 by each plant, the largest plant purchasing more than 5,000,000 pounds while the smallest purchased 203,228 pounds. Of the total quantity of milk purchased, approximately 53% was sold as fluid milk, 19% as fluid cream, and 23% as other products (buttermilk, chocolate milk, skimmilk, cottage cheese, and surplus cream), while the remainding 5% was lost or not accounted for in the disposal figures. The data indicate that approximately 70% of the fluid sales of milk and cream were at wholesale prices and the other 30% at retail prices.

The gross sales value of the fluid sales was $3.568 per 100 pounds of milk purchased for 17 of the 22 plants. This represents a gross sales value of 7.67c per quart of milk. These same 17 plants paid $1.641 per 100 pounds of milk. The difference between the gross sales value and the cost of milk, amounting to $1.927 ($3.568-$1.641), was retained by the plants and represents their average spread. The total operating cost of these 17 plants was $1.915 (excluding interest not paid), which indicates that the average profit was 1.2c per 100 pounds of milk purchased. A profit of 1.2c per 100 pounds was equal to a return of 0.44% on the average investment for the year or is equal to one cent profit for every 39 quarts of milk-equivalent sold. Seven of the 17 plants did not make any returns on their investment. The small return on the investment for 1933 would indicate that any increase in the cost of milk to the plants would necessitate a corresponding increase to the consumer unless the distributing plants can reduce their costs or are willing to operate at a loss.

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